PATENT SPECIFICATION 944,747

DRAWINGS ATTACHED.

944,747

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COMPLETE SPECIFICATION.

Improvements in or relating to Devices for Sorting Flat Objects, for example, Letters or Cards.

We, SIEMENS & HALSKE AKTIENGESELLSCHAFT, a Germany Company, of Berlin and Munich, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :

The present invention relates to a device for sorting flat objects, for example, letters or cards, which have previously been provided with a destination sign.

Single letter sorting machines can usually only cater for relatively small numbers of destinations as otherwise the machine would become too large and cumbersome. Frequently, this small number of destinations is inadequate and several machines then have to be used each sorting out different destinations. A disadvantage with this arrangement, however, is that pre-sorting is required, that is, the whole batch of articles to be sorted, for example letters have to be distributed amongst the individual machines according to the destinations required. One method of pre-sorting post for example, is by means of a sorting machine which divides the letters into as many sections as there are sorting machines for the final sorting process, but this procedure is wasteful and lengthy, since, basically each postal batch must pass through a sorting machine twice.

According to the present invention a device for sorting flat objects comprises two or more sorting machines, capable of detecting code signs superimposed upon the objects to be sorted, each sorting machine having direct outlets for only a proportion of the total number of code signs in use and a supplementary outlet or outlets leading to the other machine or machines associated therewith for objects which it cannot place in one of its direct outlets, and each machine handling simultaneously objects received from the other machine or machines intended for its outlets and objects which have not been sorted.

In this way, each machine sorts not only the post received from the other machines but also items which are received directly, the sorting machines thus being used in an economical manner and the necessity for separate pre-sorting being completely removed. This makes it possible to standardize on the type of machine used, whereas in arrangements employing pre-sorting machines two different types of machines are usually required. In the device according to the invention only those objects being directed to a sorting machine having no direct outlet for their particular destinations are passed on to the supplementary outlets and subsequently to the other sorting machine or machines, for a direct outlet which is suitable for the object concerned. It is thus only in these circumstances that an object has to be passed through a sorting machine twice, and it is clear that this procedure of passing objects on to the appropriate sorting machine is fully automatic and that usually a great part of any particular batch of objects will only pass through a machine once.

In a convenient arrangement three sorting machines are used, each machine having two supplementary outlets which lead respectively to the inlets of the other two machines.

The invention may be performed in various ways but one specific embodiment relating to a device for sorting letters will now be described with reference to the accompanying drawing.

In this arrangement it is assumed that each

[*Price 4s. 6d.*]

of the three sorting machines A, B and C can sort into a hundred destinations, these destinations being directed into directional groups 1, 2 and 3 as indicated at the upper end of the drawing. Each directional group comprises ninety-eight final destinations or outlets, the remaining two destinations or supplementary outlets of each machine being used for pre-sorting letters for the two other directional groups. Thus with this arrangement, it is possible to sort into the two hundred and ninety-four final destinations.

The unsorted batch of letters and cards, for all destinations, is sent to the sorting machines from the coding points D, and each machine carries out final sorting of the letters for its known directional group and pre-sorts the letters for the other directional groups which are subsequently fed to the corresponding sorting machine.

Thus, when a letter for the directional group 1 arrives in machine A, it proceeds to its destination via one of the ninety-eight outlets possessed by this machine. On the other hand if a letter for directional group 2 or 3 arrives in machine A then it is fed via the supplementary outlet 2 or 3 to machine B or C subsequently passing through one of the direct outlets to this latter machine to its destination. The same procedure is carried out by letters fed into the machines B and C.

The performance of an arrangement in accordance with the invention depends chiefly on how many letters were first passed through two machines before being finally sorted. By performance, should be understood that number of letters finally sorted by the arrangement per hour. For example, if the loading of original items for machine A is such that the share of directional group 1 is very large, then the sorting performance of A is likewise very large and very little passes through to directional groups 2 and 3. The machines B and C can therefore handle more original items and therefore likewise have a higher sorting performance. In one extreme case, when each machine receives in the first batch letters for its own directional groups only, the performance of the arrangement is equivalent to the sorting performance of the three machines since each letter is sorted but once. In the other extreme case, when each machine receives in the first batch letters for other directional groups only, the performance is exactly half as great, thus, in our example, equivalent to the sorting performance of one and a half machines, since each letter is sorted twice. For the cases in which we are interested, the performance of the arrangement described lies somewhere between these two extremes. With uniform distribution, that is when each machine gets an equal number of letters for each directional group, a sorting performance of 1.8 machines is obtained.

Taking the general case, we can examine an arrangement of this type having M machines and a like number of directional groups. Each machine can sort into n different destinations of which M—1 destinations are for sorting to the remaining M—1 directional groups. The total number of final destinations N into which the arrangement as a whole can sort is then given by :—

$$N = M \cdot (n - M + 1).$$

For whole number values of M, N has a maximum value N_{max} when M has the value $M_{\equiv}$ where

$$M_{\equiv} = \left[\frac{n+1}{2}\right]$$

substituting : N_{max} has the value

$$N_{max} = \left[\frac{n+1}{2}\right] \cdot (n+1-\left[\frac{n+1}{2}\right]).$$

Here, $\left[\frac{n+1}{2}\right]$ indicates the highest natural number, smaller than or equal to $\frac{n+1}{2}$.

Thus, with this arrangement, an increase in the number of final destinations is only obtained up to a number $M_{\equiv}$ of machines. If the number of machines is increased above this figure, then the number N of final destinations proceeds to fall again.

The sorting performance of a general arrangement of this kind can also be simply expressed if the distribution of the total postal batch over the individual directional groups is known.

Devices of this kind can not only be employed for the sorting of letters and other items of post but also, for example, for sorting data cards, literature references, etc. In addition, it is possible, instead of the basic single-stage version, to make arrangements of two or more stages on the same principal.

WHAT WE CLAIM IS :—

1. A device for sorting flat objects comprising two or more sorting machines capable of detecting code signs superimposed on the objects to be sorted, each sorting machine having direct outlets for only a proportion of the total number of code signs in use and a supplementary outlet or outlets leading to the sorting machine or machines associated therewith for objects which it cannot place in one of its direct outlets, and each machine

handling simultaneously objects received from the other machine or machines intended for its outlets and objects which have not been sorted.

2. A device for sorting flat objects as claimed in Claim 1, including three sorting machines each machine having two supplementary outlets which lead respectively to the inlets of the other two machines.

3. A device for sorting flat objects substantially as described with reference to the accompanying drawing.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*